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United States Patent [19]**Jenkins**[11] **Patent Number:** **5,200,614**[45] **Date of Patent:** **Apr. 6, 1993**[54] **ION MOBILITY SPECTROMETERS**[75] **Inventor:** **Anthony Jenkins**, North Reading, Mass.[73] **Assignee:** **Ion Track Instruments, Inc.**, Mass.[21] **Appl. No.:** **821,681**[22] **Filed:** **Jan. 16, 1992**[51] **Int. Cl.⁵** **B01D 59/44; H01J 49/00**[52] **U.S. Cl.** **250/286; 250/282; 250/287**[58] **Field of Search** **250/281, 282, 286, 287, 250/288**[56] **References Cited****U.S. PATENT DOCUMENTS**

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Primary Examiner—Bruce C. Anderson**14 Claims, 3 Drawing Sheets***Attorney, Agent, or Firm*—Anthony J. Casella; Gerald E. Hespos[57] **ABSTRACT**

An ion mobility spectrometer is provided which employs an electron capture process. A sample gas stream is irradiated to produce positive ions and electrons in an ionization chamber. An open grid electrode is employed in the ionization chamber to maintain a field-free space that allows ion population to build up in the ionization chamber. However, a high electric field is periodically generated across the ionization chamber for periods of less than one millisecond to cause most ions of one polarity in the ionization chamber to be swept out and into a drift chamber. Ions of opposite polarity are discharged on the walls of the ionization chamber. The ions entering the drift chamber travel at drift velocities dependant on their respective charge and mass. A collector electrode is provided for sequentially collecting ions of differing mass, and the collected ion current is transmitted to a signal processing means for measuring intensity and arrival times for the collected ions. A potential can be maintained between the drift chamber and the ionization chamber for preventing ions from traveling down the drift chamber. However, this potential between the drift chamber and the ionization chamber may periodically be switched synchronously with the generation of the field across the ionization chamber to enable ions to pass into the drift chamber during the switching.

